

## Trifluralin

### *Chemical Information*

Trifluralin is a yellow-orange crystalline solid

**CAS Number** - 1582-09-8

**Alternate Names** - 2,6-dinitro-N,N-dipropyl-4-(trifluoromethyl)-benzamine, benzeneamine

**General Uses** - Trifluralin is an herbicide used primarily on cotton and soybean crops. trifluralin is a yellow-orange crystalline solid. Production of trifluralin has declined since restrictions on product formulation were implemented in 1982 due to carcinogenicity and mutagenicity concerns. It is used on soybean crops, cotton, wheat, alfalfa, sunflowers and many other crops.

**Potential Hazards** - This chemical is an irritant of the eyes and skin. It emits toxic fumes of fluorine and nitrogen oxides when heated to decomposition. Potential liver toxicity and blood effects (EPA Integrated Risk System --IRIS).

### *Summary Analysis– Trifluralin*

- The 56,826 pounds of trifluralin reported in 2003 accounted for 0.1 percent of the total quantity of PCs. Compared to the quantity reported in 1999, there was over a 35 percent decrease in the quantity of trifluralin.
- The number of facilities that reported trifluralin between 1999 and 2000 increased by 50 percent; 12 facilities reported this chemical in 2003. One facility reported nearly 56 percent of the total quantity. Seven of the facilities accounted for 97 percent of the total quantity.
- In 2003, about 90 percent of the trifluralin was treated. Since 1999, disposal of trifluralin decreased by almost 62 percent – to 5,634 pounds in 2003. In 1999-2003, energy recovery was only used for relatively small quantities of trifluralin and in 2003, no energy recovery was reported. Since 1999, recycling of trifluralin steadily decreased – only 159 pounds were recycled in 2003.
- In 2003, facilities in only 3 of the Regions reported trifluralin, with facilities in Region 7 reporting 83 percent of the total quantity. The quantity of trifluralin reported by Region 7 facilities has steadily decreased since 2000.
- In 2003, facilities in 3 states (Iowa, Missouri, and Texas) reported 90 percent of the total quantity of trifluralin. Facilities in Iowa reported almost 59 percent of the total quantity. One facility reported almost 96 percent of the quantity reported by facilities in Iowa.
- trifluralin was reported by facilities in 7 industry sectors in 1999-2003. In 2003, 12 facilities in 5 industry sectors reported a PC quantity of trifluralin. Eight of these 12 facilities, in SIC 2879 (Pesticides and agricultural chemicals, nec), reported over 90 percent of the trifluralin in 2003. Facilities in 5 of these industry sectors did not report trifluralin until 2000. This may be due to the lower TRI reporting threshold that became effective for trifluralin in 2000. Since 2000, these facilities, for the most part, reported a decrease or zero quantity of trifluralin in 2003.

**National Trends – Trifluralin.** Exhibit 4.239 presents the total PC quantity (pounds) of trifluralin reported in 1999 to 2003, showing the disposal, treatment, energy recovery, as well as recycling quantities. In 2003, the 56,826 pounds of trifluralin accounted for 0.1 percent of the total quantity of PCs. Compared to the quantity reported in 1999, there was over a 35 percent

decrease in the quantity of trifluralin. The number of facilities that reported trifluralin between 1999 and 2000 increased by 50 percent; 12 facilities reported this chemical in 2003.

Since 1999, most of the trifluralin was treated. Disposal of trifluralin decreased by almost 62 percent – to 5,634 pounds in 2003. Energy recovery was only used for relatively small quantities of trifluralin and in 2003, no energy recovery was reported. Since 1999, recycling of trifluralin steadily decreased – only 159 pounds were recycled in 2003.

Exhibit 4. 239. National-Level Information for Trifluralin (1999-2003)

	1999	2000	2001	2002	2003	Percent Change (1999 -2003)	Management Method -- Percent of Quantity of this Chemical in 2003
Number of Facilities	8	16	17	16	12	50.0%	
Disposal Quantity (lbs.)	14,631	11,030	13,193	12,167	5,634	-61.5%	9.9%
Energy Recovery Quantity (lbs.)	0	228	626	1,011	0	NA	0.0%
Treatment Quantity (lbs.)	73,189	77,227	79,670	50,377	51,192	-30.1%	90.1%
Priority Chemical Quantity (lbs.)	87,820	88,485	93,489	63,555	56,826	-35.3%	
Recycling Quantity (lbs.)	2,000	2,000	2,001	5,675	159	-92.1%	

Exhibit 4.240 shows the number of facilities that reported trifluralin within various quantity ranges. Of the 12 facilities that reported trifluralin in 2003, 1 facility reported nearly 56 percent of the total quantity. Seven of the facilities accounted for 97 percent of the total quantity.

Exhibit 4. 240. Distribution of Facilities that Reported Quantities for Trifluralin (2003)

Trifluralin ( 56,826 pounds)		
Quantity Reported	Number of Facilities Reporting this quantity	Percent of Total Quantity for this Priority Chemical
up to 10 pounds	0	0.0%
between 11 - 100 pounds	2	0.2%
between 101 -1,000 pounds	3	2.8%
between 1,001 - 10,000 pounds	6	41.3%
between 10,001 - 100,000 pounds	1	55.7%
between 100,001 - 1 million pounds	0	0.0%
> 1 million pounds	0	0.0%

*EPA Region Trends- Trifluralin.* Exhibit 4.241 shows the quantity (pounds) of trifluralin reported in 7 EPA Regions by facilities in 1999 to 2003. In 2003, facilities in only 3 of the Regions reported trifluralin. Facilities in Region 7 reported 83 percent of the total quantity however, the reported quantity has steadily decreased since 2000. In 2003, the quantity reported by facilities in Regions 5 and 6 increased significantly. In 1999, facilities in Region 4 had the second largest quantity of trifluralin but none was reported in 2003.

Exhibit 4. 241. Quantity of Trifluralin Reported by EPA Regions (1999-2003)

EPA Region	1999	2000	2001	2002	2003	Percent Change in Quantity (1999-2003)	Percent Of the Total Priority Chemical quantity (2003)
7	66,015	85,608	80,530	54,272	47,178	-28.5%	83.0%
6	0	228	627	1,013	6,522	NA	11.5%
5	2,255	1,159	713	1,886	3,126	38.6%	5.5%
2	0	0	206	0	0	NA	0.0%
4	19,550	872	10,415	5,764	0	-100.0%	0.0%
9	0	375	998	620	0	NA	0.0%
10	0	243	0	0	0	NA	0.0%
Total	87,820	88,485	93,489	63,555	56,826	-35.3%	

Exhibit 4. 242. Distribution of Facilities Reporting Trifluralin in 2003 & Quantity of Trifluralin Reported in 2003 per Region

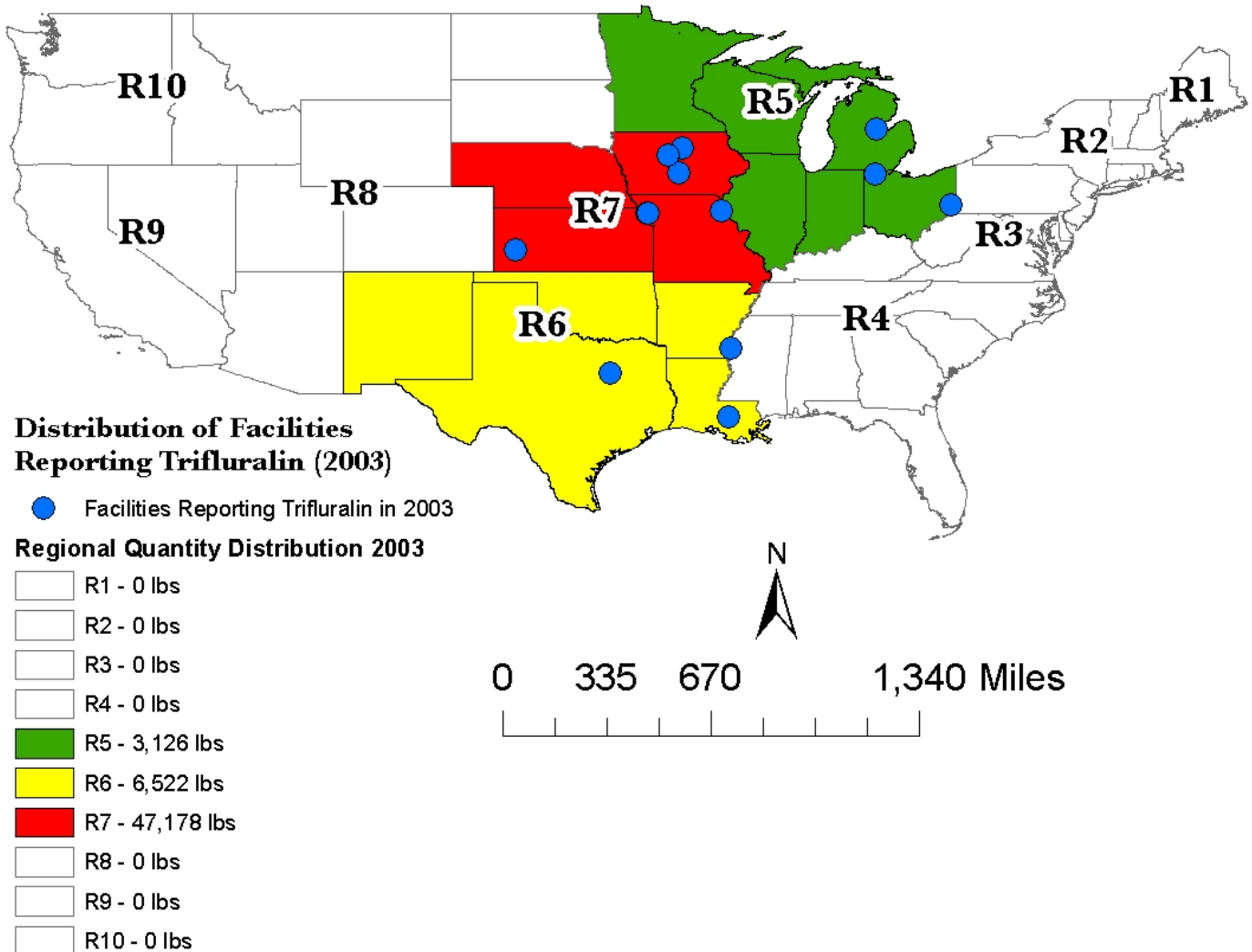


Exhibit 4.243 shows how trifluralin was managed by facilities in 3 EPA Regions in 2003. Overall, about 90 percent of the trifluralin was treated. In 2003, over 83 percent of the PC quantity of trifluralin was sent to offsite treatment, primarily by facilities in Regions 6 and 7.

Almost 95 percent of the trifluralin reported by Region 7 facilities was managed using offsite treatment; with the other 5 percent disposed onsite. Over 96 percent of the trifluralin reported by Region 5 facilities was sent to offsite disposal. Almost 97 percent of the trifluralin reported by Region 6 facilities was treated, approximately equally split between onsite and offsite treatment. In 2003, very little recycling of trifluralin was reported by facilities in these Regions.

Exhibit 4. 243. Management Methods for Trifluralin, By EPA Region (2003)

EPA Region	Disposal		Energy Recovery		Treatment		Recycling	
	Onsite Disposal	Offsite Disposal	Onsite Energy Recovery	Offsite Energy Recovery	Onsite Treatment	Offsite Treatment	Onsite Recycling	Offsite Recycling
7	2,400	0	0	0	700	44,078	0	0
6	0	220	0	0	3,102	3,200	0	0
5	0	3,014	0	0	103	9	159	0

*State Trends- Trifluralin.* Exhibit 4.244 shows the quantity of trifluralin, between 1999 and 2003, that was reported by facilities in 15 states. In 2003, facilities in 3 states (Iowa, Missouri, and Texas) reported 90 percent of the total quantity of trifluralin. Facilities in Iowa reported almost 59 percent of the total quantity. One facility reported almost 96 percent of the quantity reported by facilities in Iowa (Exhibit 4.245). Prior to 2003, only small quantities (no more than 2 pounds) of trifluralin were reported by facilities in Texas (Exhibit 4.245). In 2003, a facility in Texas reported over 11 percent of the total quantity of trifluralin. Facilities in a number of states did not report a quantity of trifluralin until 2000. This may be due to the lower TRI reporting threshold that became effective for trifluralin in 2000. Facilities in 5 states that had reported a quantity of trifluralin in 1999-2002 did not report any quantity in 2003.

Exhibit 4. 244. State-Level Information for Facilities Reporting Trifluralin (1999-2003)

State	1999	2000	2001	2002	2003	Change in Quantity (1999-2003)	Percent Change in Quantity (1999-2003)	Percent of Total Quantity of this Priority Chemical (2003)
Iowa	57,530	66,091	65,187	19,519	33,267	-24,263	-42.2%	58.5%
Missouri	8,485	11,493	6,543	25,953	11,511	3,026	35.7%	20.3%
Texas	0	0	1	2	6,320	6,320	NA	11.1%
Ohio	2,255	1,154	713	1,886	3,109	854	37.9%	5.5%
Kansas	0	7,800	8,800	8,800	2,400	2,400	NA	4.2%
Louisiana	0	0	0	0	202	202	NA	0.4%
Michigan	0	0	0	0	17	17	NA	0.0%
Arkansas	0	228	626	1,011	0	0	NA	0.0%
California	0	375	998	620	0	0	NA	0.0%
Georgia	7,450	0	10,335	5,586	0	-7,450	-100.0%	0.0%
Mississippi	12,100	872	80	178	0	-12,100	-100.0%	0.0%
Nebraska	0	224	0	0	0	0	NA	0.0%
New Jersey	0	0	206	0	0	0	NA	0.0%
Washington	0	243	0	0	0	0	NA	0.0%
Wisconsin	0	5	0	0	0	0	NA	0.0%

Exhibit 4. 245. Trends Analysis on States with Largest Quantity Increase and Decrease (1999 – 2003): Facilities in Texas and Iowa

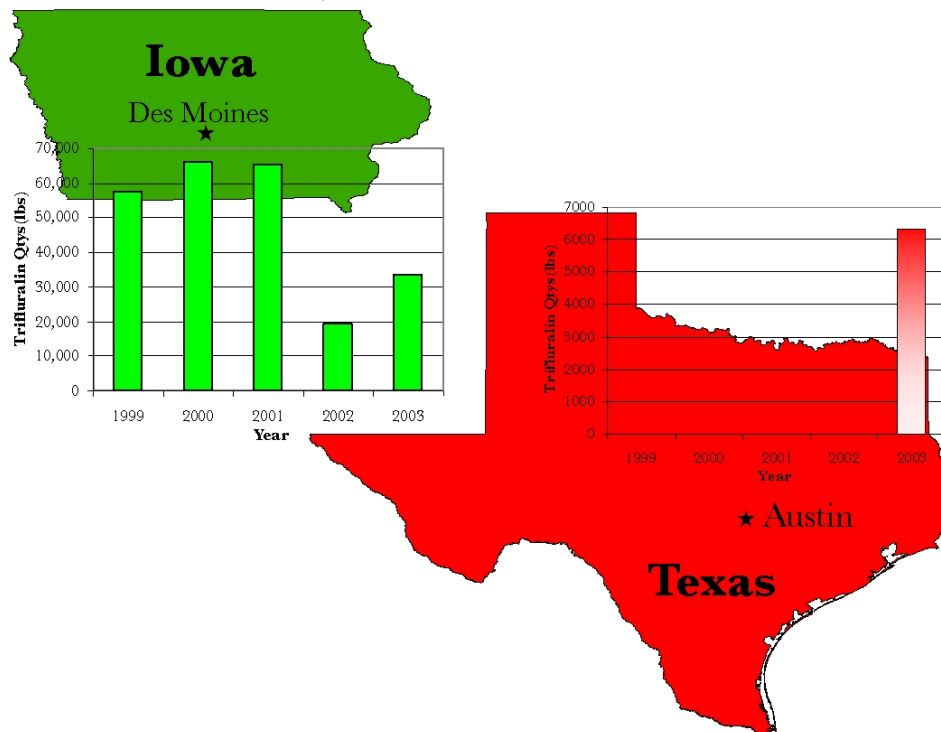


Exhibit 4. 246. Trends Analysis of States Reporting 4 Largest Quantities of Trifluralin (2003)

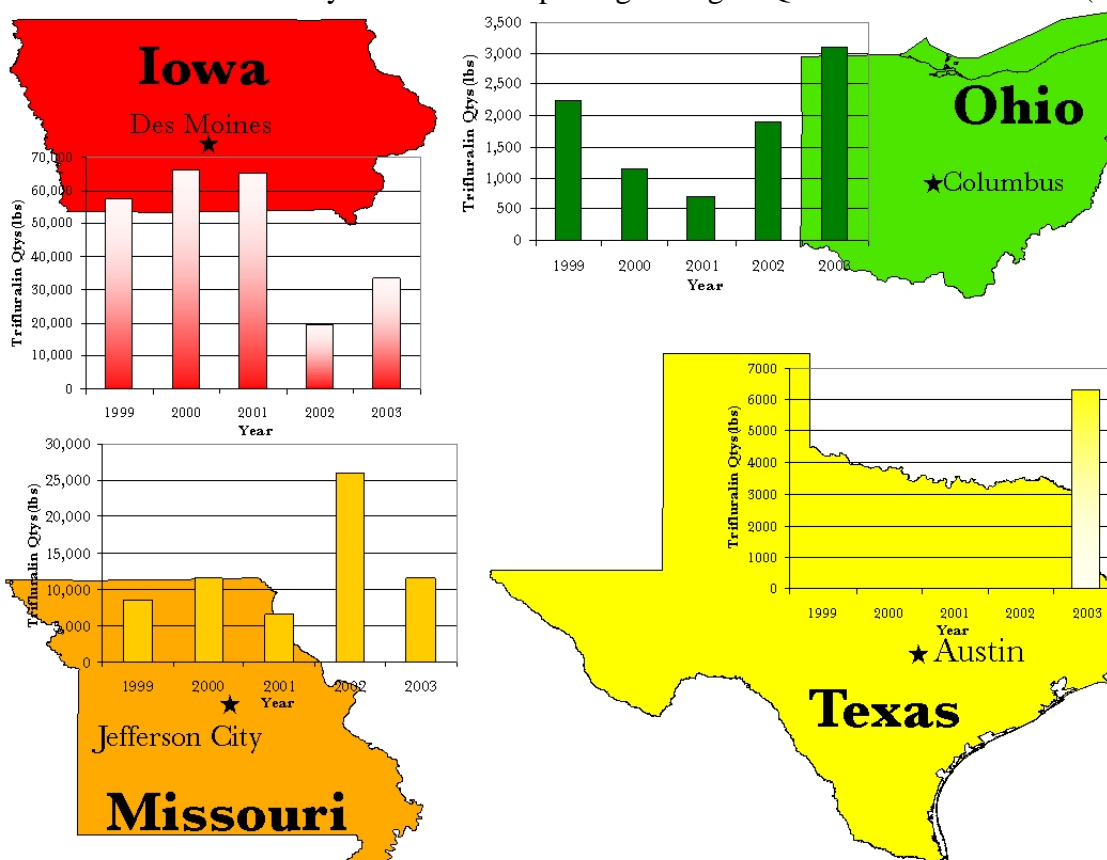


Exhibit 4.247 shows how trifluralin was managed by facilities in the 7 states that reported a quantity of this PC in 2003. Over 90 percent of the trifluralin was treated, including virtually the entire quantity of trifluralin reported by facilities in Iowa, Missouri, Texas, Louisiana, and Michigan. One facility in Ohio also used treatment (onsite and offsite) to manage the trifluralin. About 83 percent of the treatment was offsite. Approximately 10 percent of the trifluralin was land disposed. Two facilities, one each in Ohio and Kansas, disposed almost 100 percent of the trifluralin; offsite disposal by the Ohio facility and onsite disposal for the Kansas facility. Very little recycling of trifluralin was reported in 2003.

Exhibit 4. 247. Management of Trifluralin in States (2003)

State	Total Priority Chemical Quantity (2003)	Onsite Disposal	Offsite Disposal	Onsite Energy Recovery	Offsite Energy Recovery	Onsite Treatment	Offsite Treatment	Onsite Recycling	Offsite Recycling
Iowa	33,267	0	0	0	0	0	33,267	0	0
Missouri	11,511	0	0	0	0	700	10,811	0	0
Texas	6,320	0	220	0	0	2,900	3,200	0	0
Ohio	3,109	0	3,014	0	0	86	9	159	0
Kansas	2,400	2,400	0	0	0	0	0	0	0
Louisiana	202	0	0	0	0	202	0	0	0
Michigan	17	0	0	0	0	17	0	0	0

*Industry Sector (SIC) Trends- Trifluralin.* Exhibit 4.248 shows the PC quantity (pounds) of trifluralin reported by 7 industry sectors (SIC codes) where facilities reported this chemical in 1999-2003. In 2003, 12 facilities in 5 industry sectors reported a PC quantity of trifluralin. Eight of these 12 facilities, in SIC 2879 (Pesticides and agricultural chemicals, nec), reported over 90 percent of the trifluralin in 2003. There was a 40 percent decrease in the quantity of trifluralin reported by SIC 2879 facilities, compared to the quantity reported in 1999. One facility in the SIC 2875 (Fertilizers, mixing only) industry sector reported an almost 34 percent increase since 1999.

Facilities in 5 of these industry sectors did not report trifluralin until 2000. This may be due to the lower TRI reporting threshold that became effective for trifluralin in 2000. Since 2000, these facilities, for the most part, reported a decrease or zero quantity of trifluralin in 2003.

Exhibit 4. 248. Industry Sector-Level Information for Trifluralin (1999-2003)

Primary SIC Code	SIC Description	Number of Facilities for this SIC Code (2003)	1999	2000	2001	2002	2003	Change in Quantity (1999-2003)	Percent of Total Quantity of this Priority Chemical (2003)
2879	Pesticides and agricultural chemicals, nec	8	85,565	78,589	82,373	50,677	51,300	-40.0%	90.28%
2875	Fertilizers, mixing only	1	2,255	1,186	1,067	2,636	3,014	33.7%	5.30%
2011	Meat packing plants	1	0	8,043	8,800	8,800	2,400	NA	4.22%
2032	Canned specialties	1	0	105	96	86	95	NA	0.17%
2869	Industrial organic chemicals, nec	1	0	0	206	0	17	NA	0.03%
3084	Plastics, pipe	0	0	334	321	345	0	NA	0.00%
9511	Air, water, and solid waste management	0	0	228	626	1,011	0	NA	0.00%

Exhibit 4.249 shows how trifluralin was managed by the 12 facilities in the 5 industry sectors that reported a quantity of this PC in 2003. More than 99 percent of the trifluralin reported by facilities in SIC 2879 (Pesticides and agricultural chemicals, nec) was treated – mostly offsite. Likewise, the entire quantity of trifluralin reported by facilities in SIC 2032 (Canned specialties) and SIC 2869 (Industrial organic chemicals, nec) was treated, primarily onsite. Land disposal was used to manage the entire quantity of trifluralin reported by facilities in SIC 2875 (Fertilizers, mixing only) and SIC 2011 (Meat packing plants). Onsite recycling of a small quantity of trifluralin was reported by one facility in SIC 2875.

Exhibit 4. 249. Management of Trifluralin in Industry Sectors (SIC Codes) (2003)

Primary SIC Code	SIC Description	Onsite Disposal	Offsite Disposal	Onsite Energy Recovery	Offsite Energy Recovery	Onsite Treatment	Offsite Treatment	Onsite Recycling	Offsite Recycling
2879	Pesticides and agricultural chemicals, nec	0	220	0	0	3,802	47,278	0	0
2875	Fertilizers, mixing only	0	3,014	0	0	0	0	159	0
2011	Meat packing plants	2,400	0	0	0	0	0	0	0
2032	Canned specialties	0	0	0	0	86	9	0	0
2869	Industrial organic chemicals, nec	0	0	0	0	17	0	0	0

*Recycling.* Exhibit 4.250 provides some indication of the extent to which facilities in certain industry sectors recycled at least 100 pounds of trifluralin in 1999-2003, rather than manage it as a waste. For those year(s), the facility did not report a PC quantity, i.e., a quantity managed via land disposal, energy recovery, or treatment.

Exhibit 4. 250. Facilities reporting Recycling but not a PC quantity (1999-2003)

			1999		2000		2001		2002		2003	
Number of Facilities	EPA Region	State	Onsite Recycle	Offsite Recycle	Onsite Recycle	Offsite Recycle	Onsite Recycle	Offsite Recycle	Onsite Recycle	Offsite Recycle	Onsite Recycle	Offsite Recycle
<b>SIC 2874 -- Phosphatic Fertilizers</b>												
1	9	California	2,000	0	0	0	0	0	6,865	0	0	0
<b>SIC 3999 -- Manufacturing industries, nec</b>												
1	5	Ohio	85,000	0	5,500	0	5,700	0				